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The Patent and Trademark Office date stamp sets forth the receipt date (or both the receipt date and the Serial Number) of a patent application identified as follows:

Applicant: Shackleford, J. Barry

Title: Combinatorial Fitness Function Circuit

[x] Transmittal Letter _1_ Pgs.

[ ] Appln. ____ Pgs Spec. ___ Pgs Claims ___Total Claims ___ Pgs Abstract

[ ] Rule 53(b) (CIP) or [ ] Rule 53(d) (CPA) Request _____ Pages

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[x] Appeal Brief _22__ Pages

[ ] PTO Form 1449 ___ Pages [ ] Prior Art Ref – No. References ____

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PATENT APPLICATION

ATTORNEY DOCKET NO. 10008128-1

IN THE
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): Shackleford, J. Barry

Confirmation No.: 5766

Application No.: 09/986,531

Examiner: Hirl, Joseph P.

Filing Date: 11/8/2001

Group Art Unit: 2121

Title: COMBINATORIAL FITNESS FUNCTION CIRCUIT

Mail Stop Appeal Brief-Patents
Commissioner For Patents
PO Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF

Sir:

Transmitted herewith is the Appeal Brief in this application with respect to the Notice of Appeal filed on **January 7, 2005**.

The fee for filing this Appeal Brief is (37 CFR 1.17(c)) $500.00.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

( ) (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d) for the total number of months checked below:

( )	one month	$120.00
( )	two months	$450.00
( )	three months	$1020.00
( )	four months	$1590.00

( ) The extension fee has already been filled in this application.

(X) (b) Applicant believes that no extension of time is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

Please charge to Deposit Account **08-2025** the sum of **$500.00**. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees. A duplicate copy of this sheet is enclosed.

( ) I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, Alexandria, VA 22313-1450. Date of Deposit: _____

OR

(X) I hereby certify that this paper is being transmitted to the Patent and Trademark Office facsimile number **(703) 872-9306** on **March 7, 2005**

Number of pages: **24**

Typed Name: **Leland Wiesner**

Signature: *Leland Wiesner*

Respectfully submitted,

Shackleford, J. Barry

By *Leland Wiesner*

Leland Wiesner

Attorney/Agent for Applicant(s)
Reg. No. **39424**

Date: **03/07/2005**

Telephone No.: **(650) 853-1113**

PAGE 2/24 * RCVD AT 3/7/2005 7:59:52 PM [Eastern Standard Time] * SVR:USPTO-EFXRF-1/1 * DNIS:8729306 * CSID:6508531114 * DURATION (mm-ss):09-18

First Named Inventor	Shackleford, J. Barry	IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
Serial No.	09/986,531	
Filing Date	11/9/2001	
Group Art Unit	2121	
Examiner Name	Hirl, Joseph P.	In Re Application of:
Confirmation No.	5766	J. Barry Shackleford
Docket No.	10008128-1	
Title: COMBINATORIAL FITNESS FUNCTION CIRCUIT		

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APPEAL BRIEF

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Alexandria, VA 22313-1450

TABLE OF CONTENTS

I. INTRODUCTION

Appellant filed a Notice of Appeal to the Board of Patent Appeals and Interferences on January 7, 2005. In accordance with 37 C.F.R. § 41.37, one copy of this Appeal Brief is hereby filed, and is accompanied by a fee in the amount of $330.00 as required under 37 C.F.R. § 41.20(b)(2).

II. REAL PARTY IN INTEREST

The present application has been assigned to Hewlett Packard Development Corporation, L. P., a corporation organized and existing under and by virtue of the laws of the State of Delaware, and having an office and principal place of business at 20555 S. H. 249; Houston, TX 77070, in an assignment recorded September 30, 2003, at Reel 014061, Frame 0492.

III. RELATED APPEALS AND INTERFERENCES

Applicant is unaware of any other related appeals or interferences that may directly affect or be directly affected by or have a bearing on the Board's decision in the present appeal.

IV. STATUS OF THE CLAIMS

Claims 10-18 stand rejected under 35 U.S.C. § 101 as being directed to non-statutory subject matter.

Claims 3 and 18 stand rejected under 35 U.S.C. § 112 first paragraph as failing to comply with the enablement requirement.

Claim 1-18 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,185, 547 of *Shackleford et al.* ("the '547 patent").

Appellant appeals the rejection of all of the pending claims 1-18 which are set forth in the attached Appendix A.

V. STATUS OF AMENDMENTS

The amendments to the claims have all been entered.

VI. SUMMARY OF CLAIMED SUBJECT MATTER

The present claims are directed to a particular fitness function used in conjunction with genetic algorithm (GA) programming. GA programming is one approach to solving complex programs with the aid of software and circuitry. Consequently, it is useful to understand the general framework of GA programming in order to better understand the nature of the subject matter contained in the instant application. The below diagram identified as FIG.3 is described on page 6, lines 2-34 of the application as filed and is paraphrased below.

Title: COMBINATORIAL FITNESS FUNCTION CIRCUIT
Inventor(s): J. Barry SHACKLEFORD
Contact Name: Lloyd E. Dakin, Jr. (650) [illegible]-2295
Attorney Docket No.: 10008128-1

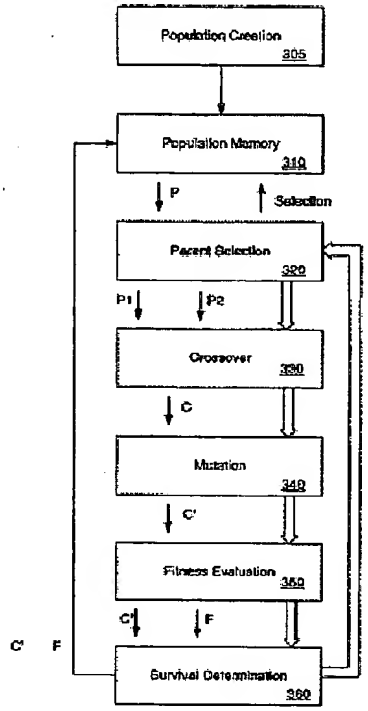

Fig. 3

Initially, a GA programming solution begins by creating a "population" of randomly generated "chromosomes" (step 305). The terms "chromosome" and "population" are used in GA programming as the overall analytical framework is inspired by genetics. In the realm of living creatures, genetic diversity and natural selection combines genetic material to be passed down through a progeny of living creatures over many hundreds of generations. In comparison, GA programming uses digital chromosomes having a sequence of bits and corresponding to one potential solution to a particular problem. The population in GA programming represents an initial collection of these different randomly generated digital chromosomes.

To identify an optimal solution, the effectiveness of each chromosome as a solution to the problem being analyzed is evaluated by a fitness function and assigned a fitness value. The fitness value is a value indicating the particular chromosomes' relative ability to solve the problem being investigated. Accordingly, numerous chromosomes and associated fitness values generated by the fitness function are stored in a population memory (step 310) for later processing. Because the fitness function is tailored to a specific problem, different fitness functions are most likely to evaluate each chromosome differently and produce different fitness values.

One chromosome in the population memory is randomly selected as a first parent chromosome (P1) while another is also selected randomly as a second parent chromosome (P2) (step 320). In subsequent iterations of the operation, the first parent chromosome (P1) moves down to being the second parent chromosome (P2) and a new chromosome is selected from the population memory to become the new first parent chromosome (P1).

A child chromosome C is then created (step 330) by combining the first parent chromosome (P1) with the second parent chromosome (P2) through a crossover process. Crossover essentially splices different portions of the first (P1) and second (P2) parent chromosomes together to create a new "child chromosome". In many cases, the crossover process occurs using a singlepoint crossover. The singlepoint crossover refers to using a single point, rather than several points, in each of the parent chromosomes (P1 and P2) to divide and recombine them into a child chromosome C.

There is also a chance that a mutation may occur thus further altering a potential solution or child chromosome. For example, a mutation (step 340) potentially causes each bit in the child chromosome C to become altered.

After mutation, an evaluation of the child chromosome C' is made by a fitness function (step 350). A preferred fitness function is a re-configurable circuit which evaluates the problem-specific fitness of a child chromosome, as is understood in the art. Finally, the survival of the mutated child chromosome C' is determined (step 360) based upon the fitness value F of the child chromosome C' outputted from the fitness function 350.

The fitness function circuit taught in the present case is used to solve a class of combinatorial genetic algorithm problems often referred to as the TSP or traveling salesman problem. The TSP problem arises in scheduling planes, trains, cargo and other resources. Generally, the TSP problem seeks to find the shortest route between n cities in which all n cities are visited once and only once without revisiting. The solution to a TSP type problem describes a particular order of traveling between cities, such that the distance traveled is minimized and the shortest or most optimal route is discovered.

The fitness function initially places one potential solution to the combinatorial GA problem in a solution register having several component parts. Each of these components parts of the register are connected to a corresponding number of data tables that contain identical copies of a matrix of partial solutions to the combinatorial problem. Because each of the matrices has identical partial solutions, the potential solution in the solution register selects a particular combination of partial solutions from the matrices and adds them together in parallel using an adder. The resulting value produced by the adder represents the fitness value for the particular combination of partial solutions indicated by the potential solution in the solution register.

Further details about various components of the methods outlined above are described and discussed at other sections of the specification. Such detailed discussions of the subject matter of the pending claims are not limited to the specific sections of the specification recited above, but instead the entire detailed description contains discussion relating to the methods and embodiments of the present invention. However, attempt has been made to identify certain specially relevant sections of the specification to assist in the analysis of the claims.

VII. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. WHETHER CLAIMS 10-18 ARE DIRECTED TO NON-STATUTORY SUBJECT MATTER UNDER 35 U.S.C. § 101.

B. WHETHER A DICTIONARY DEFINITION IS APPROPRIATE TO DEFINE THE TERM 'REGISTER' WHEN IT IS IN CONTRADICTION TO OTHER TERMS IN THE CLAIMS AND THE OVERALL SPECIFICATION.

C. WHETHER CLAIM 3 AND CLAIM 18 FAIL TO COMPLY WITH THE ENABLEMENT REQUIREMENT 35 U.S.C. § 112, FIRST PARAGRAPH.

D. WHETHER CLAIMS 1, 10, AND 16 ARE ANTICIPATED BY THE '547 PATENT UNDER 35 U.S.C. § 102(E).

E. WHETHER CLAIMS 2-9, 11-15, AND 17-18 ARE ANTICIPATED BY THE '547 PATENT UNDER 35 U.S.C. § 102(E).

VIII. ARGUMENT

A. CLAIMS 10-18 ARE DIRECTED TO STATUTORY SUBJECT MATTER UNDER 35 U.S.C. § 101 AS THEY TEACH THE USE OF CIRCUITRY AND SOFTWARE COMPONENTS TO ACCOMPLISH A TANGIBLE RESULT IN A USEFUL AND CONCRETE MANNER.

The Examiner rejected claims 10-18 as directed to non-statutory subject matter citing the "practical application test" requiring that a "useful, concrete and tangible result" be accomplished. Additionally, the Examiner further asserts that these claims represent "abstract methodology and therefore are intangible". Unfortunately, the Examiner's assertions are conclusory and lack sufficient analysis and support to establish even a prima facie case.

In State Street Bank & Trust Co., v. Signature Financial Group, Inc., 149 F.3d 1368, 47 U.S.P.Q.2d (BNA) 1596 (Fed. Cir. 1998), the Federal Circuit articulated the

following test for patentability under this section developed from In re Alappat, 33 F.3d 1526; 31 U.S.P.Q.2d (BNA) 1545 (Fed. Cir. 1994), and Arrhythmia Research Technology, Inc., v. Corazonix Corp., 958 F.2d 1053; 22 U.S.P.Q.2d (BNA) 1033 (Fed. Cir. 1992). A claim defines subject matter eligible for patent protection if the claim contains a practical application or, equivalently, if the invention defined by the claim produces "a useful, concrete and tangible result."

1. A result is useful if it lies within the technological arts.

Although the court in *State Street* did not further define the term "useful," courts have previously interpreted "useful" as meaning "in the technological arts. See *Evans v. Eaton*, 16 U.S. 454; 4 L. Ed. 433; 3 Wheat. 454 (1818) (explaining that "a patent may be for a new and useful art; but it must be practical"); *In re Toma*, 575 F.2d 872 (C.C.P.A. 1978) (holding that a "method for enabling a computer to translate natural languages is in the technological arts, *i.e.*, it is a method of operating a machine")

In the instant case, computations performed by the method recited in claims 10-18 are directed toward solving a combinatorial class of problems using circuitry with registers and adders designed in accordance with the principles of GA programming. For example, claim 10 supports this analysis and recites "A method for determining the fitness of a potential solution for a combinatorial genetic algorithm problem" and that this method includes at least the operations of "inputting a plurality of potential solution values into a solution register" and "adding, by an adder connected to each of the respective data tables". The language and context of this claim clearly indicate that the Appellant is claiming statutory subject matter as it relates to operating computing machinery and circuitry and as both registers and adders are recognized as being very real and tangible parts of circuitry.

Appellant teaches and claims a fitness function useful in scheduling planes, trains, shipping containers, computing resources and other resources to solve the Traveling Salesman Problem (or TSP), as is known in the art. Thus, claims 10-18 are within the technological arts and useful.

2. A result is concrete or tangible, and thus not abstract, if it lies within the physical realm.

The terms "tangible" and "concrete" come from the *Alappat* case. In that case, the Federal Circuit explained that "abstract ideas" were "disembodied," or divorced from physical manifestations. Patentable subject matter, on the other hand, was tangible and concrete.

> Given the foregoing, the proper inquiry in dealing with the so called mathematical subject matter exception to § 101 alleged herein is to see whether the claimed subject matter as a whole is a disembodied mathematical concept, whether categorized as a mathematical formula, mathematical equation, mathematical algorithm, or the like, which in essence represents nothing more than a "law of nature," "natural phenomenon," or "abstract idea."

Claims to a specific machine that lies in the physical realm, however, are not abstract, as the Federal Circuit explained:

> Although many, or arguably even all, of the means elements recited in claim 15 represent circuitry elements that perform mathematical calculations, which is essentially true of all digital electrical circuits, the claimed invention as a whole is directed to a combination of interrelated elements which combine to form a machine for converting discrete waveform data samples into anti-aliased pixel illumination intensity data to be displayed on a display means. n23 This is not a disembodied mathematical concept which may be characterized as an "abstract idea," but rather a specific machine to produce a useful, concrete, and tangible result.

As previously described, claim 10 not only recites using registers and adders but also refers to a specific machine that solves the combinatorial class of problems associated with scheduling resources referred to as the TSP problem. Claims 10-18 concern evaluating a potential solution to a combinatorial problem and generating a fitness value that determines the fitness of the potential solution to this TSP problem.

Accordingly, the present invention provides a practical and effective method of selecting an optimal allocation of resources whether it is on a computer chip or in the scheduling of railways or other technological arts. Clearly, claim 10 is not an abstract concept as it is not only uses registers and adders in the physical realm but is grounded in physical manifestations as it solves the physical problem of scheduling resources in an optimal manner.

B. IT IS INAPPROPRIATE TO USE A DICTIONARY TO DEFINE THE TERM 'REGISTER' IN A MANNER THAT CONTRADICTS OTHER TERMS IN THE CLAIMS AND THE OVERALL SPECIFICATION.

Appellant respectfully submits that the Examiner has inappropriately used the dictionary to define the term 'register' and conclude that claims 10-18 are not an embodiment in the technical arts. In the Examiner's office action dated 09/07/2004, the Examiner cited Merriam Webster's Collegiate Dictionary, Tenth Edition, 1998, page 984 to define the term 'register' as: "a written record containing regular entries of items or details" (emphasis added). Based on this reasoning, the Examiner concluded that claims 10-18 could be performed with pen and paper.

In general, claims should not be interpreted in a vacuum but read in light of and as part of the specification. Slimfold Mfg. Co. v. Kinkead Indus., Inc., 810 F.2d 1113, 1116, 1 USPQ2d 1563, 1566 (Fed. Cir. 1987) (citing Hybritech Inc. v. Monoclonal Anti-bodies, Inc., 802 F.2d 1367, 1385, 231 USPQ 81, 94-95 (Fed. Cir. 1986); In re Mattison, 509 F.2d 563, 565, 184 USPQ 484, 486 (CCPA 1975)). FIG. 4 and the corresponding text of the specification disclose registers and adders in a circuit diagram schematic (pg. 8, lines 1-34 of the Application). These registers are defined implicitly through functional language of the specification as storage areas used to store different values while processing data (pg. 8, lines 4-26 of the Application). The specification does not mention or allude to using pen and paper as this would contradict the purpose of using circuitry and processors to quickly identify a solution.

Even if a register were defined as a "pen and paper", it would make no sense to combine the term register with the remainder of the terms in the various claims. ("[A] common meaning, such as one expressed in a relevant dictionary, that flies in the face of the patent disclosure is undeserving of fealty."); Id. (citing Liebscher v. Boothroyd, 258 F.2d 948, 951, 119 USPQ 133, 135 (C.C.P.A. 1958) ("Indiscriminate reliance on definitions found in dictionaries can often produce absurd results.")) In claim 10, for example, a register implemented as a "pen and paper" would be impossible to interface and use with the circuitry of an "adder" also recited in claim 10. Consequently,

combining a register implemented with pen and paper would result in an inoperable circuit. Accordingly, it is inappropriate to define the term "register" using the dictionary entry selected as it contradicts the meaning already conveyed in the specification and claims.

Indeed, if a dictionary is required to define the term 'register' than at least a definition taken from the context of computer science should be used. Accordingly, another common usage of the term in the context of computer science is: a part of the central processing unit used as a storage location[1]. Another definition is: A small, high-speed computer circuit that holds values of internal operations, such as the address of the instruction being executed and the data being processed. When a program is debugged, register contents may be analyzed to determine the computer's status at the time of failure[2]. Either of these latter definitions would be more appropriate in light of the specification and claims than the definition chosen by the Examiner.

C. CLAIM 3 AND CLAIM 18 COMPLY WITH THE ENABLEMENT REQUIREMENT 35 U.S.C. § 112, FIRST PARAGRAPH AS ONE SKILLED IN THE ART WOULD BE ABLE TO MAKE AND USE THAT WHICH IS CLAIMED.

The Examiner rejected claim 3 and 18 under 35 USC 112, first paragraph for allegedly failing enablement. In the office action dated 02/02/2004 on pg. 4, lines 19-22 the Examiner asserts that page 11, lines 1-2 of the application indicate that the addition is done in serial rather than in parallel as recited in claim 3. Unfortunately, this portion of the application as filed is not referring to the addition operation referred to in claim 3 and therefore enablement is not an issue.

Instead, page 11, line 1-2 of the application refers to the way in which a person must travel "in order" from city to city and the "particular distance a traveler must make to visit all of the cities in that order". Appellant respectfully submits that the Examiner

1 The American Heritage Dictionary of the English Language, Fourth Edition, 2004, Houghton Mifflin Company
2 Computer Desktop Encyclopedia, 1981-2005 Computer Language Company Inc.

has improperly interpreted the phrase "in order" out of context. One skilled in the art reading page 11, line 1-2 would understand this does not describe the operation of an adder but merely the reality that traveling between cities in the TSP or other similar class of problems occur as a sequence of events.

Conversely, the example adder depicted in FIG. 4 and recited in claim 3 unambiguously operates in parallel. One skilled in the area would realize from viewing FIG. 4 that distance table RAM 421-428 each have an input to adder 430 and operate in parallel rather than in serial. It is also mentioned later that adder 430 in FIG. 4 operates in parallel at page10, line 33 of the application as filed. Thus, page 11, lines 1-2 do not support the Examiner's assertion of ambiguity and lack of enablement. Instead, Appellant respectfully submits that one skilled in the art would clearly see FIG. 4 and corresponding references in the specification satisfy 35 USC 112, first paragraph for claim 3.

The Examiner also asserts that claim 18 fails enablement under 35 USC 112, first paragraph because the changing out the fitness function or matrix of partial solutions was not addressed. This is also clearly an incorrect assertion with no support. Those skilled in the art of GA programming know how to change a fitness function and corresponding data depending on the particular GA problem. Appellant has indicated a novel and non-obvious approach of using "another matrix of partial solutions" as recited in claim 18 however the process of using another dataset or fitness function in a GA machine need not extensive explanation. Those skilled in the art know that different datasets and fitness functions allow a GA machine to solve different problems.

In addition, the Appellant notes that a matrix of partial solutions is described at least on page 9, lines 4 to 34, page 10, lines 1-34, FIG. 4, FIG. 5, FIG. 6 and elsewhere in the application. Consequently, one skilled in the art would readily understand the meaning of the word 'matrix' in claim 18 corresponds to the terms 'grid' or 'table' as used in the specification and therefore understand this teaching as well. Merely using a different term does not create an enablement issue as long as one skilled in the art could understand, make and use the invention.

Likewise, the specification clearly teaches that a matrix of partial solutions would result when connecting a matrix to one part of a register having a complete 'solution' as disclosed in FIG. 4 and on at least page 8, lines 4-16 of the application as filed. For example, distance table RAM 420 is table or matrix of partial solutions containing smaller tables or matrices depicted as distance table RAM 421-428. The address of a potential solution is contained in register 410 and divided into partial addresses and, upon lookup in the multiple distance table RAM 421-428, into partial solutions as recited in claim 3 and 18. These partial solutions retrieved from the tables or matrices are added in parallel using adder 430 to produce a fitness value. This is consistent with a more concrete example of the fitness function operation and possible solution provided on pg. 9, lines 28-34 and page 10, lines 1-34.

D. CLAIMS 1, 10, AND 16 ARE NOT ANTICIPATED BY THE '547 PATENT UNDER 35 U.S.C. § 102(E) BECAUSE AT LEAST ONE ELEMENT IN THE CLAIMS IS NOT IN THE '547 PATENT .

The Examiner rejected claims 1-18 under 35 USC 102(e) as anticipated by Shackleford (US Pat. 6,185,547).

However, the Examiner has failed to establish the prima facie case as each and every element in claims 1, 10 and 16 are not taught by the '547 patent. See Richardson v. Suzuki Motor Co., 868 F.2d 1226, 1236, 9 U.S.P.Q.2D (BNA) 1913, 1920 (Fed. Cir.), cert. denied, 493 U.S. 853, 107 L. Ed. 2d 112, 110 S. Ct. 154 (1989) (explaining that an invention is anticipated if every element of the claimed invention, including all claim limitations, is shown in a single prior art reference). See Jamesbury Corp. v. Litton Industrial Products, Inc., 756 F.2d 1556, 1560, 225 USPQ 253, 256 (Fed. Cir. 1985) (explaining that the identical invention must be shown in as complete detail as is contained in the patent claim). See Verdegaal Bros., Inc. v. Union Oil Co., 814 F.2d 628,

631, 2 U.S.P.Q.2D (BNA) 1051, 1053 (Fed. Cir. 1987) (explaining that a prior art reference anticipates a claim only if the reference discloses, either expressly or inherently, every limitation of the claim). See Kloster Speedsteel AB v. Crucible, Inc., 793 F.2d 1565, 1571, 230 U.S.P.Q. (BNA) 81, 84 (Fed. Cir. 1986) ("Absence from the reference of any claimed element negates anticipation.")

Claim 1 recites "inputting a plurality of potential solution values into a solution register, said solution register comprising a plurality of component parts thereof" however the '547 patent cited by the Examiner does not disclose "a solution register" as recited in claim 1. Instead, the '547 patent in FIG. 7, col. 4, lines 63-64 describes a 'least-fit chromosome register' as cited by the Examiner and this is not a 'solution register'. The least-fit chromosome register 49 in FIG. 7 of the '547 patent is a particular type of register used to hold the 'least-fit' of two parent chromosomes. The parent chromosome with the lower fitness value is taken from either the first or second chromosome registers 41 and 42 in FIG. 7 and placed in the 'least-fit chromosome register' to facilitate removal of the 'least-fit' parent from the population and replacement with a child chromosome (Col. 12, lines 25-30 of the '547 patent).

In contrast, a solution register holds a solution value used to access one or more distance tables and used to generate a fitness value (FIG. 4, pg. 8, lines 1-34 of the application as filed). The solution register does not contain the least-fit parent chromosome to be replaced as described in the '547 patent.

Furthermore, the '547 patent does not describe a fitness function that uses "a plurality of data tables....each of said data tables comprising a matrix of partial solutions to said combinatorial genetic algorithm problem" as recited in claim 1. Instead, the

fitness function in the '547 patent described on Col. 26, lines 19-67 and Col. 27, lines 1-67 describe a different analysis for a different problem. The '547 patent describes a fitness function concerning solving a set coverage problem and not a combinatorial genetic algorithm problem as recited in claims 1, 10 and 16. There is also no discussion of using partial solutions to solve a combinatorial or other GA problem in the '547 patent.

The set coverage type problem from the '547 patent attempts to select a minimum set of events to perform a set of operations. For example, testing a DRAM may require expensive chip testing equipment to perform 100 or more different tests. While the 100 or more different tests cannot all be performed at the same time, they can be performed in different groups. If all the groups of tests are performed then some of the tests will be performed multiple times which is unnecessary and wasteful of the testing machine cycles. Accordingly, the fitness function in the '547 patent identifies the smallest group of tests to be performed while getting all of the 100 tests completed; this is a set coverage problem as applied to testing DRAM but is not equivalent or the same as the combinatorial genetic algorithm problem in claims 1, 10 and 16.

In addition, claim 10 recites "indexing said matrices of partial solutions to said genetic algorithm within said plurality of data tables, the two respective ones of said component parts determining respective particular partial solutions within the respective matrices" yet the Examiner has not pointed out with particularity where the '547 patent even possibly mentions this particular limitation.

Further, representative claim 10 recites "adding, by an adder connected to each of the respective data tables, respective outputs from each of said data tables, whereby the sum of said adder determines the fitness of said potential solution for said genetic

algorithm problem" however the '547 patent does not describe or teach this limitation. Instead, the '547 patent describes using a first carry-save adder to add the "column signal counts either of input 0 and input 1 based upon the bit value of the bit number of 1s in the coverage vector" (Col. 27, lines 18-21 of the '547 patent) and a second carry-save adder to add "chromosome cost sums [sic] the bit values of 1s in an n-bit chromosome and outputs an added value to the aggregate cost register 134 as the chromosome cost" (Col. 27, lines 24-26 of the '547 patent). Neither of at least these references teaches each and every element as recited in claim 10. Similar elements from claim 10 found in claim 1 and claim 16 are also not described or taught by the '547 patent either.

For at least these reasons provided above, the '547 patent does not anticipate claims 1, 10 or 16.

E. CLAIMS 2-9, 11-15, AND 17-18 ARE NOT ANTICIPATED BY THE '547 PATENT UNDER 35 U.S.C. § 102(E) BECAUSE AT LEAST ONE ELEMENT IN THE CLAIMS IS NOT IN THE '547 PATENT.

Appellant respectively submits that claims 2-9, 11-15 and 17-18 are not anticipated under 35 U.S.C. § 102(e) because claims 2-9, 11-15 and 17-18 depend from claims 1, 10, and 16 respectively and the '547 patent does not disclose or teach all of the elements contained in claims 1, 10 and 16 as indicated previously.

IX. CONCLUSION

Appellant respectfully submits it has demonstrated that the cited reference does not teach or suggest each and every element of the pending claims 1-18 and that the rejections under 35 U.S.C. § 102(e) cannot be maintained.

For at least the reasons discussed above, Appellant submits that the pending claims are patentable. Accordingly, Appellant requests that the Board of Appeals reverse the Examiner's decisions regarding claims 1-18.

Respectfully submitted,

Date: 03/07/2005

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CLAIMS APPENDIX A

What is claimed is:

1. (Previously Presented) A fitness function circuit for determining the fitness of a potential solution for a

combinatorial genetic algorithm problem, said fitness circuit comprising:

a solution register containing said potential solution for said genetic algorithm problem therein, said solution register comprising a plurality of component parts thereof;

a plurality of data tables, the number of data tables corresponding to the number of said component parts of said solution register, respective data tables having inputs

from two respective ones of said component parts of said solution register, each of said

data tables comprising a matrix of partial solutions to said combinatorial genetic algorithm problem, the two respective ones of said component parts determining a particular respective partial solution, each of said matrices having identical entries therein; and

an adder connected to each of said plurality of data tables, said adder adding respective partial solutions from each of said plurality of data tables, thereby determining

the fitness of said potential solution for said combinatorial genetic algorithm problem.

2. (Previously Presented) The fitness function circuit according to claim 1, wherein said data tables include partial solutions specific to the sequential order of the potential solution.

3. (Previously Presented) The fitness function circuit according to claim 1, wherein said adder adds said partial solutions from the respective data tables in parallel.

4. (Previously Presented) The fitness function circuit according to claim 3, wherein said partial solutions from the respective data tables are added substantially simultaneously.

5. (Previously Presented) The fitness function circuit according to claim 1, wherein each of said matrices within said data tables comprises an abbreviated matrix of partial solutions to said combinatorial genetic algorithm problem.

6. (Previously Presented) The fitness function circuit according to claim 5, wherein said abbreviated matrix contains at least (n)(n- 1)/2 entries.

7. (Previously Presented) The fitness function circuit according to claim 1, wherein at least two of the two respective ones of said component parts correspond to different entries within said matrices.

8. (Previously Presented) The fitness function circuit according to claim 7, wherein all of the two respective ones of said component parts correspond to different entries within said matrices.

9. (Previously Presented) The fitness function circuit according to claim 8, wherein said combinatorial genetic algorithm problem is the Traveling Salesman Problem.

10. (Previously Presented) A method for determining the fitness of a potential solution for a combinatorial genetic algorithm problem, said method comprising the steps of:

inputting a plurality of potential solution values into a solution register, said

solution register comprising a plurality of component parts thereof;

receiving, after said step of inputting, at each of a plurality of data tables two respective ones of said component parts of said solution register, the number of data tables corresponding to the number of said component parts of said solution register, each of said data tables comprising a matrix of partial solutions to said combinatorial genetic algorithm problem, each of the matrices having identical entries therein;

indexing said matrices of partial solutions to said genetic algorithm within said plurality of data tables, the two respective ones of said component parts determining respective particular partial solutions within the respective matrices; and

adding, by an adder connected to each of the respective data tables, respective outputs from each of said data tables, whereby the sum of said adder determines the fitness of said potential solution for said combinatorial genetic algorithm problem.

11. (Previously Presented) The method according to claim 10, wherein in said step of receiving, at each of said plurality of data tables, two respective ones of said component parts of said solution register are received substantially simultaneously.

12. (Previously Presented) The method according to claim 10, wherein in said step of receiving, wherein at least two of the two respective ones of said component parts correspond to different entries within said matrices.

13. (Previously Presented) The method according to claim 12, wherein all of the two respective ones of said component parts correspond to different entries within said matrices.

14. (Previously Presented)The method according to claim 13, wherein said combinatorial genetic algorithm problem is the Traveling Salesman Problem.

15. (Previously Presented) The method according to claim 10, wherein in said step of receiving, at each of said plurality of data tables, two respective ones of said component parts of said solution register correspond to the sequential order of the potential solution values in said solution register.

16. (Previously Presented)A methodology for determining the fitness of a particular potential solution for a

combinatorial genetic algorithm problem from a pool of potential solutions, said methodology comprising steps of:

(a) inputting a plurality of potential solution values into a solution register, said solution register comprising a plurality of component parts thereof;

(b) receiving, substantially simultaneously, at each of a plurality of data tables two respective ones of said component parts of said solution register, the number of data tables corresponding to the number of said component parts of said solution register, each of said data tables comprising a matrix of partial solutions specific to said genetic algorithm problem, each of the matrices having identical entries therein;

(c) indexing said matrices of partial solutions to said genetic algorithm within said plurality of data tables, the two respective ones of said component parts determining respective particular partial solutions within the respective matrices;

(d) adding, by an adder connected to each of the respective data tables, respective outputs from each of said data tables in parallel, whereby the sum of said adder determines the fitness of said particular potential solution for said genetic algorithm problem;

(e) comparing the fitness of said particular potential solution to a fitness threshold; and

(f) replacing a prior potential solution from said pool of potential solutions with said particular potential solution if said fitness of said particular potential solution exceeds said fitness threshold, and otherwise deleting said particular potential solution.

17. (Previously Presented) The methodology according to claim 16, said methodology repeating said steps (a)- (f) with another particular potential solution with the same matrix of partial solutions.

18. (Previously Presented)The methodology according to claim 16, said methodology repeating said steps (a)- (f) with another particular potential solution with another matrix of partial solutions, said another matrix corresponding to partial solutions for another genetic algorithm problem.